

Salmonella transport through irrigation systems and occurrence on crops at harvest

C. Harris¹, D. Lee², E. Antaki³, M. Tertuliano¹, K. Levy², M. Jay-Russell³, S. Rajeev¹, G. Vellidis¹ (yiorgos@uga.edu)

¹University of Georgia, Tifton, GA; ²Emory University, Atlanta, GA; ³University of California, Davis, CA



THE UNIVERSITY OF GEORGIA
COLLEGE OF AGRICULTURAL &
ENVIRONMENTAL SCIENCES

Introduction

Previous studies have shown that *Salmonella* is often detectable in ponds used to store water for irrigation. Our goal is to understand the risks posed by typical levels of *Salmonella* in irrigation ponds and irrigation systems found at fruit and vegetable farms in south central Georgia, and evaluate strategies for mitigating those risks.

Study design

In this ongoing study, we are measuring *Salmonella* and *E. coli* levels in five water sources (several ponds and one well) and various irrigation systems (center pivots, drip, and solid-set sprinklers). Fruit and vegetable crops under each system are harvested at maturity and analyzed for *Salmonella*.



Sampling irrigation water from a center pivot



Sampling irrigation water from a solid-set sprinkler



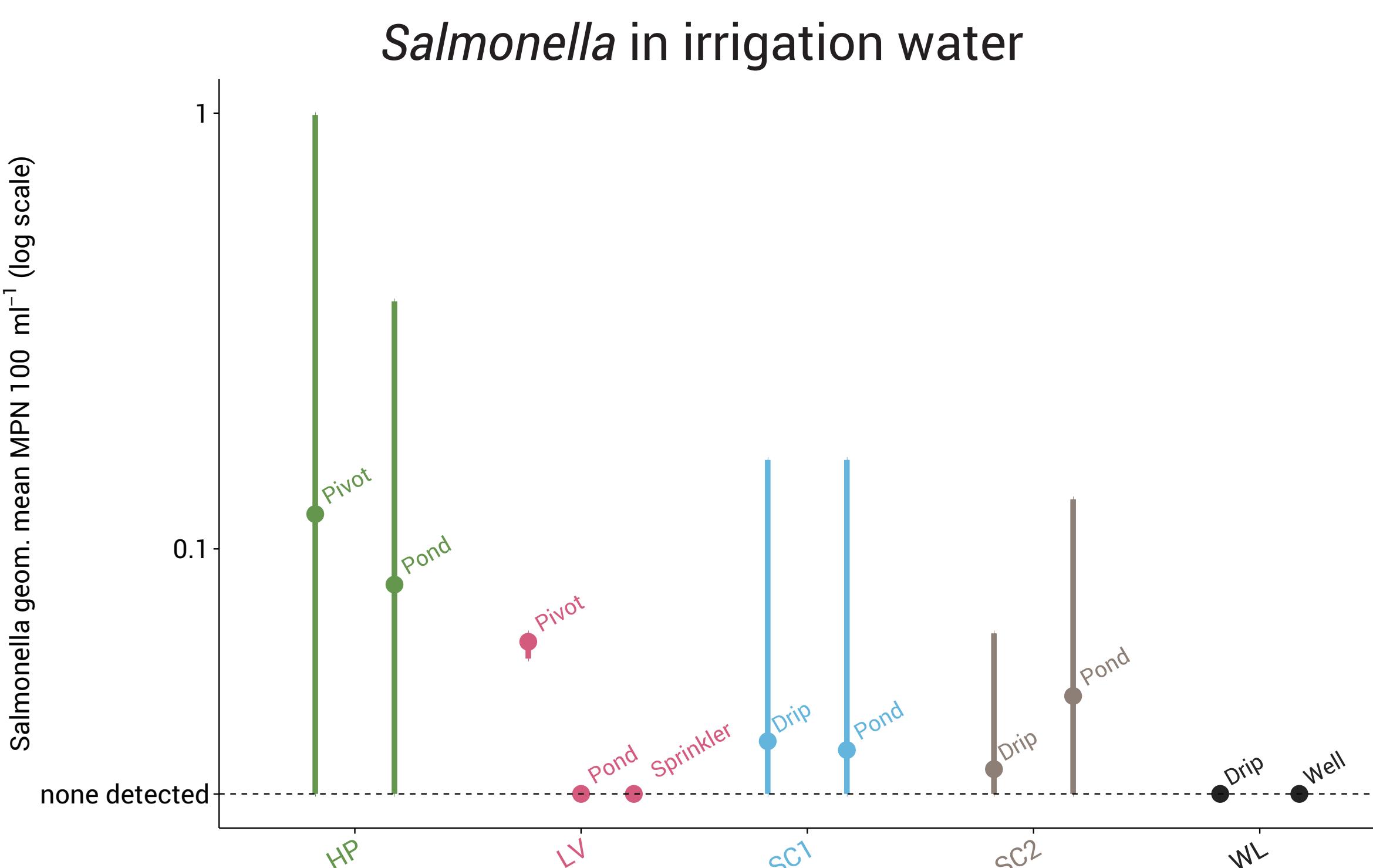
Sampling irrigation water from a drip line



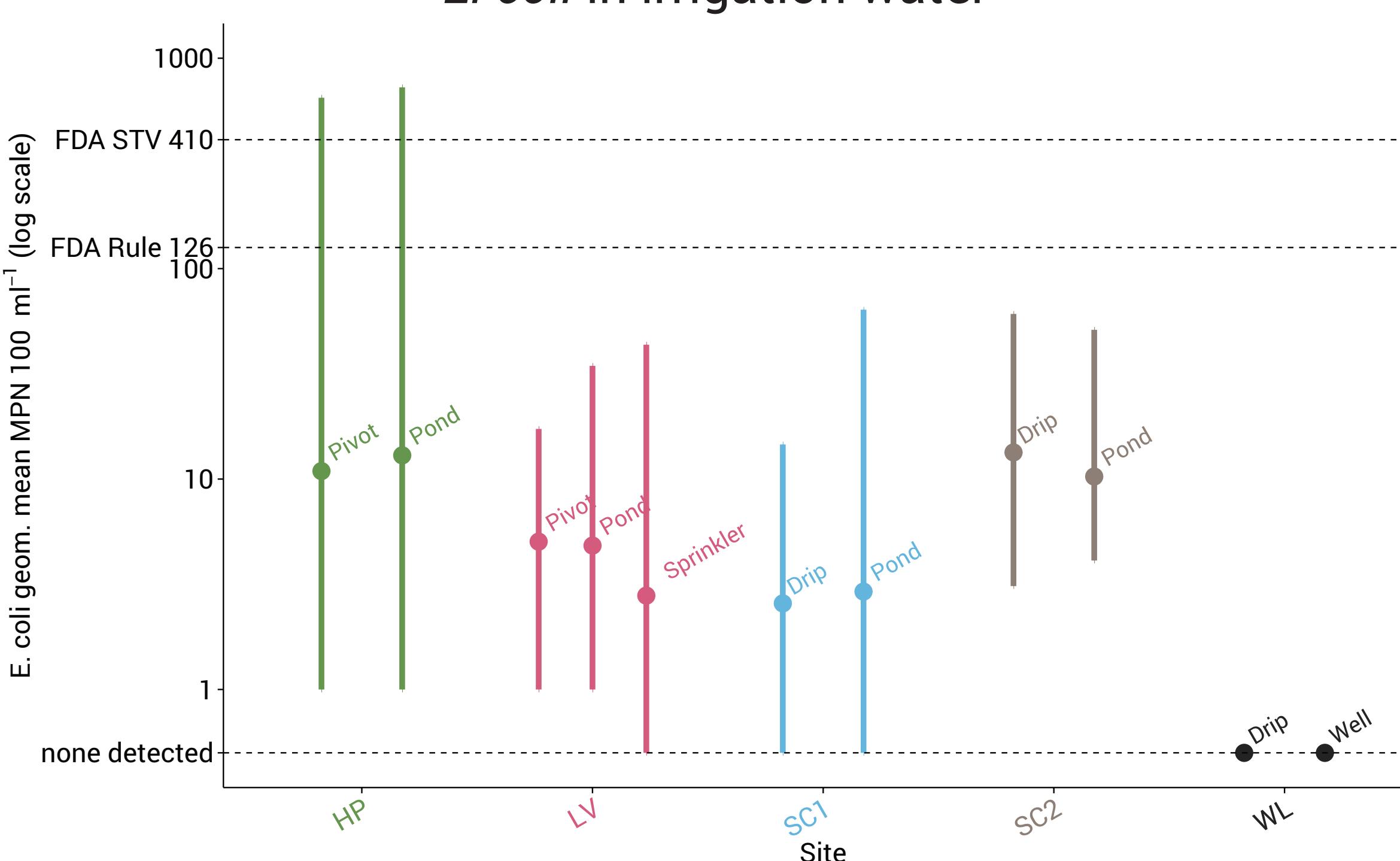
Sampling water from a pond

Salmonella and *E. coli* in irrigation water

- *Salmonella* and *E. coli* levels in irrigation water sources and irrigation systems (dots denote average concentrations while bars extend to the maximum and minimum concentrations detected in individual samples):

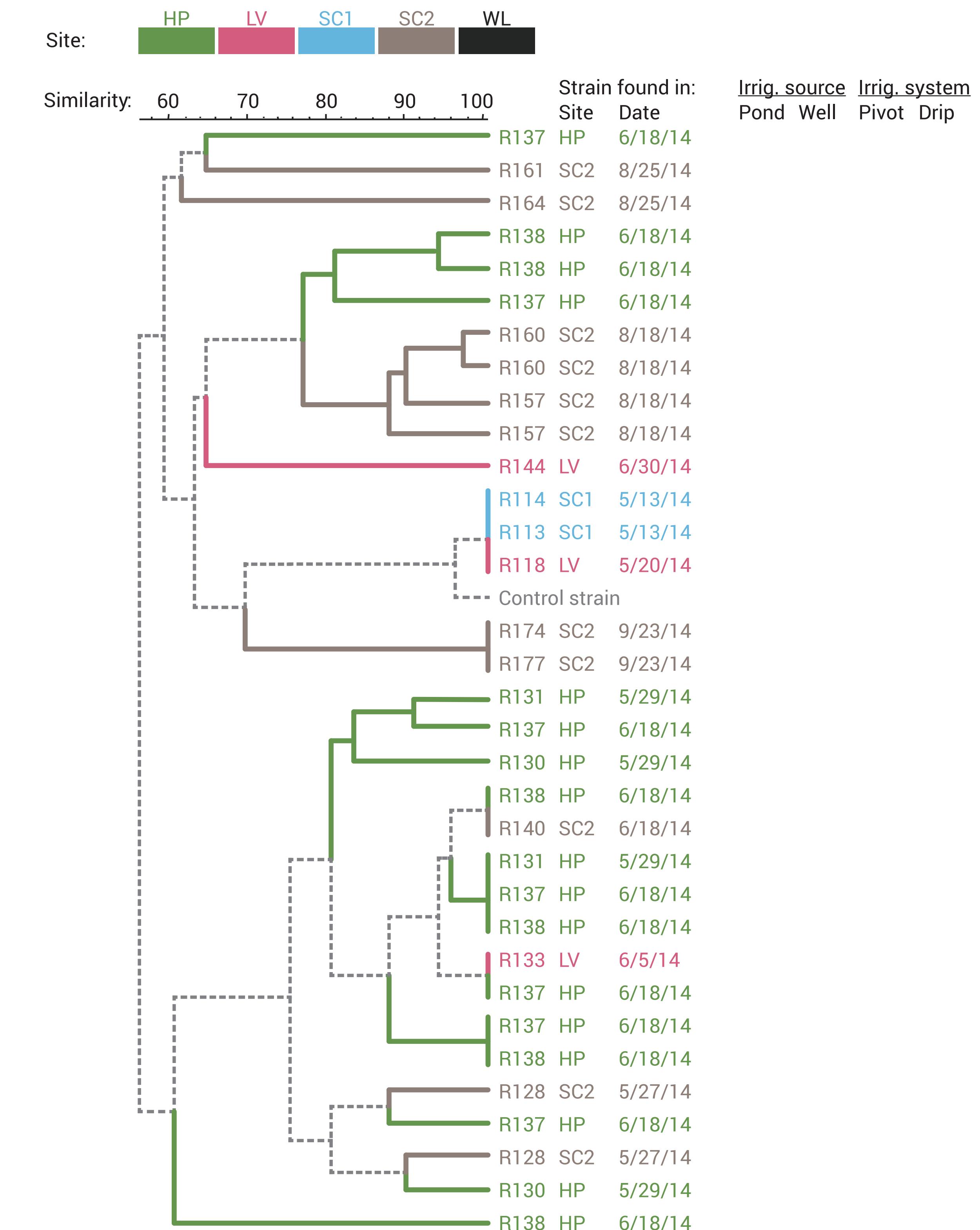


E. coli in irrigation water



Genetic similarity of *Salmonella* strains

- Genetic similarity (based on PFGE analysis) of *Salmonella* strains found in water sources and irrigation systems:



Preliminary results: *Salmonella* occurrence on the surface of harvested produce

- *Salmonella* was detected at very low levels (<0.055 MPN 100 ml⁻¹) on one cantaloupe sample at site HP and one cucumber sample at site SC1. No other samples contained detectable *Salmonella*:

Site	Date	Crop	Irrigation	# Samples	Fruits/sample	Salmonella detected?	
HP	6/20/14	Cantaloupes	Pond Pivot	5	2	Yes, in 1/5 samples	
LV	7/02/14	Cantaloupes	Pond Pivot	5	2	No	
SC1	5/28/14	Squash	Pond Drip	5	6	No	
SC1	7/28/14	Cucumbers	Pond Drip	5	8	Yes, in 1/5 samples	
SC2	6/23/14	Watermelons	Pond Drip	5	1	No	
WL	6/20/14	Bell peppers	Well Drip	5	6	No	
WL	9/22/14	Cucumbers	Well Drip	5	8	No	



Harvesting cantaloupes



Harvesting cantaloupes



Harvesting bell peppers

Conclusions and next steps

Salmonella strains found in irrigation ponds are also sometimes present in irrigation systems. *Salmonella* may persist on the surface of some crops until harvest, although it is not clear from this study whether *Salmonella* was acquired from soil or irrigation water contact. During 2015, we will evaluate risk-reduction strategies including the use of chlorine dioxide to remove *Salmonella* from irrigation water.

Acknowledgements

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